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ABSTRACT

The usefulness of state-by-state comparisons and other educational indicators is discussed in this paper, which seeks to improve report writing and data presentation skills. The first part offers an example of a policy report that uses key education indicators to describe the Arizona education system. Tables and data interpretation describe the system's size and diversity, fiscal resources, and student performance. The second part explains the policy analysis report process and how researcher values influence the interpretation and presentation of data. Problems in interpreting state rankings of student achievement are discussed. A conclusion is that state rankings help to reveal system strengths and weaknesses, shape dialogue and research questions, and ensure financial support for schools. Fourteen tables are included. (50 references) (LMI)

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THE USEFULNESS OF STATE-BY-STATE COMPARISONS AND OTHER EDUCATION INDICATORS TO POLICYMAKING:

AN EXAMPLE FROM ARIZONA

ARNOLD B. DANZIG

INTRODUCTION

The rate of available information is accelerating. New magazines and books, regular television and cable channels, the ordinary and electronic mail, all putting increasing demands on the time to absorb information and energy to respond in a meaningful way. Policymakers are similarly inundated and have the responsibility of sifting through the calls and letters, newspapers, research reports and analysis, and then determining a course of action. "Keep it simple; one page or less" speaks to the difficulty policymakers have in controlling time and information flow. Yet the request to put information succinctly does not explain how policymakers view and use information, be it from the public, press, researchers or policy analysts.

The purpose of this essay is to assist educational researchers and policy analysts in making their work more available to policymakers by discussing how to view and how to think about educational indicators, particularly highly publicized findings such as state-by-state comparisons. The paper tries to make explicit the thinking that goes on when a policy report is prepared and draws on the authors experience in policy analysis at the Arizona Department of Education. The discussion of how researchers and policy analysts report education indicators such as state education rankings is intended to encourage a more critical and reflective thinking by those engaged in the craft about their work, and in the end lead to better connections between the research, analysis and the development of sound educational policy. As the nation begins a new round of state performance comparisons based on results of the National Assessment of Educational Progress (NAEP) the problems of making sense and drawing valid meaning, for both analyst and policy maker, gain increasing importance.

In order to accomplish this goal, the paper takes two directions. First, an example of typical practice, one which summarizes key state education indicators, is presented. Tables and discussion are adapted from a report by Danzig and Mungazi done for the Arizona Townhall Academy, a group of

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business, community and educational leaders who meet on an annual basis to on a selected topic.[1] The topic selected for 1989 was education and the title of the Report was S.O.S...Save Our Schools, Save Our State. The work is similar in underlying approach to policy reports done at many state department 's of education and includes discussion of the education system in Arizona , education indicators, and selected comparisons with other states. The second part of the paper looks more to the concept of usefulness and discusses how policy analysts prepare their reports and some of the values that are part of a seemingly straightforward reporting of "facts." Values, in this sense, refer to reasons why certain problems are approached, questions asked and comparisons accomplished. Ultimately, it is hoped this will shed some light for others in the reading and interpreting of education reports and state-by-state comparisons.

State-By-State Education Comparisons

A number of federal agencies provide data from which state-by-state comparisons are made. The U. S. Department of Education's Center for Education Statistics annually publishes The Digest of Education Statistics and The Condition of Education, which contain educational statistics of interest to educational leaders and policymakers that are reported on a national and state-by-state basis. Beginning in 1984, and every year since, the Office of Planning, Budget and Evaluation in the U.S. Department of Education has published State Education Statistics or more commonly referred to as the "Secretary's Wall Chart," a summary of key indicators concerning population characteristics, resources, and educational achievement for each of the states and presented in a large poster or chart format. The U.S. Commerce Department , Bureau of of the Census also reports government and school finance data from which state ranking is possible.[2]

National and regional organizations also publish education statistics which include state rankings. The National Education Association compares and ranks states on variables deemed of interest to teachers including salary and per pupil expenditure data .[3] The Western Interstate Commission for Higher Education (WICHE) focuses on higher education but includes analysis of demographics and teacher supply and demand data for states in the western region of the United States.[4] The Southern Region Education Board compares states in the south on education indicators with particular focus on

measuring pupil achievement.[5] Beginning in 1988, the Council of Chief State School Officers published State Education Indicators , a summary of demographic and fiscal backround information bearing on the states' investiment in schooling.[6] Plans to look at comparative indicators of student outcomesbased on an expanded National Assessment of Education Progress are currently in the works.

Finally, public and private groups provide comparative analysis of state education indicators. The Institute for Educational Leadership looks at demographic indicators and compares states on selected education variables such as retention, teacher salary and per pupil expenditure.[7] On request, IEL will provide a summary of key indicators targeted at a specific state. Policy Analysis for California Education, funded by the Hewlett Foundation and jointly directed by professors at the University of California Berkeley and Stanford University , provides analysis of education indicators and trends for California schools and often includes comparisons with other states.[8]

The preceding should give some indication of the large numbers of organizations and individuals interested in knowing not only in how education fares in a particular state, but also in how a state compares with other states, be it states of similar size, economic diversity, geographic region or some other basis of comparison. And it would seem logical that each group that accomplishes an analysis has its own purposes and audience. The next section presents an example of typical practice that spotlights Arizona in its discussion of education.

TYPICAL PRACTICE: DESCRIPTION OF SIZE AND DIVERSITY

In describing a state's education system, information is presented concerning the number, size and diversity of schools, districts, students and teachers. Such information tells the reader who is involved and how many there are of them. Selected variables such as size (of schools, of districts) and geographic location (urban, rural) permit contrasts and comparisons among localities to be made. Since data are collected on a regular basis (for the most part annually), the writer is able to present a view of selected variables over time and provide the reader the opportunity to look at possible implications of such changes.

Number and Size of Arizona Schools and Districts

During fiscal year 1986-87, there were 217 school districts in Arizona consisting of 781 elementary schools and 151 high schools.[9] Of this number, there were 14 one-room schools. Table 1 provides data on district size and the reader should note the relatively large number of small districts (45 districts with enrollment less than 100).

Table 1

Arizona School District Size

[in Average Daily Membership (ADM)]

ADM	# of Districts	Percentage
Less than 100	45	20
100 - 600	55	25
601 - 1,000	28	13
1,001 - 5,000	64	29
5,001 - 10,000	11	5
10,001 - 20,000	10	5
20,001 - 30,000	2	1
Over 30,000	2	1

Source: Arizona Department of Education. School Finance Fact Sheet, 1987e.

The reader should also note an increase in the number of schools. In fiscal year 1987-1988, the total number of elementary schools had increased to 798 (up 17 schools) and the number of high schools had increased to 159 (up 8 schools) . At the same time the total number of districts declined by seven, from 217 to 210 districts.[10]

Schools on the Reservation

Ten school districts (Chinle, Ganado, McNary, Red Mesa, Window Rock, Tuba City, Cedar, Kayenta, Whiteriver, and Sacaton) with 34 schools serving approximately 1,900 students, are located totally on a reservation. An additional 29 school districts have one or more schools located on a reservation.[11]

Demographics

Arizona continues to experience population growth. Between 1970 and 1985, Arizona's population shows 79.5 percent growth, compared to a national growth rate of 17.4 percent. Between 1985 and the year 2000, Arizona's population growth is projected at 70 percent, compared to a 12.2 percent population growth forecast for the nation as a whole.[12]

Arizona's population is also somewhat younger than the national average, indicating higher educational needs. In Arizona, 8.5 percent of the population is under five, compared to 7.6 percent for the nation as a whole. According to the U.S. Department of Education, the school-age population for Arizona is 604,000 or approximately 19.0 percent of total population in Arizona.[13] This compares with 18.8 percent for the nation. One implication is that there will continue to be strong growth in the school-age population during the coming decade.

Growing Minority Populations

Minority populations are growing as a proportion of the total population of Arizona. Table 2 indicates the extent to which there is changing demography in Arizona, with particular emphasis noted for the population of age five and younger.

Table 2
Changing Demography in Arizona

Ethnicity	1980 All Ages	1980 Under Age 5	1986 AZ K-12 Pupils	1986 Births
Black	2.0%	3.3%	4.0%	3.4%
Spanish Origin	10.7%	25.6%	22.3%	34.7%
American Indian	3.5%	9.2%	6.5%	6.2%
White (Non-Hisp.)	83.1%	61.0%	65.8%	54.6%
Others	0.7%	0.9%	1.4%	1.1%

Sources: WICHE, 1986; Arizona Department of Education. School Finance Factsheet,1988.

Among all ages of the Arizona population in 1980, 83.1 percent were Anglo, 10.7 percent Hispanic origin, and 6.2 percent other minorities. Among age five and younger in 1980, 61.0 percent were Anglo, 25.6 percent Spanish origin, 9.2 percent American Indian and 3.3 percent Black. Among new births in Arizona

in 1986, nearly one-half were from minority populations with 34.7 percent of Arizona births in 1986 being Hispanic. This represents a changing school age population.

Primary Language and Arizona Students

One of the issues raised by the changing ethnicity of the population is the increasing language diversity of Arizona pupils. Table 3 indicates the primary home language of students enrolled in Arizona's public schools during the 1985-86 school year and shows that slightly more than 16 percent of Arizona pupils cite a language other than English as their primary home language. For certain counties, i.e., Santa Cruz (82%), Apache (55%), and Yuma (40%), the figures are much higher and pose special challenges for the public schools to meet.

Table 3
Primary Home Language Enrollment by County
Arizona Public Schools - 1986

County	English	Spanish	Indian	Other	Total Non-English	%Non-English
Apache	6,241	49	7,372	21	7,452	55%
Cochise	4,930	4,804	7	339	5,150	26%
Coconino	13,619	259	3,941	82	4,282	24%
Gila	6,634	440	718	10	1,168	15%
Graham	4,619	287	263	1	551	11%
Greenlee	2,208	99	6	0	105	5%
La Paz	2,376	599	4	8	611	20%
Maricopa	98,044	29,628	880	3,792	34,300	26%
Mohave	13,553	137	257	69	463	3%
Navajo	11,698	379	4,811	29	5,210	31%
Pima	80,779	18,061	250	1,816	20,127	20%
Pinal	19,497	3,080	584	39	3,703	16%
Santa Cruz	1,134	5,023	0	36	5,069	82%
Yavapai	13,971	444	90	30	564	4%
Yuma	11,865	7,656	101	73	7,830	40%
TOTALS:	501,165	71,045	19,284	6,345	96,674	16%

Source: Arizona Department of Education. Bilingual Programs and English as a Second Language Programs, 1987d.

In summary, the data suggest a relatively large number of small school districts, a large number of reservation schools, and a large number of one-room schools. Demographic trends indicate a higher than national average birth rate, and a growing number of minority school-age children. Finally, a high

proportion of Arizona's school-age population is seen as coming from homes with a primary language other than English. One might conclude that as a state, Arizona has a rapidly expanding and changing population the implications of which are yet to be explored.

TYPICAL PRACTICE: DESCRIPTION OF FISCAL RESOURCES

This next section attempts to answer five questions concerning the financing of elementary and secondary education in Arizona. Information is presented to answer questions concerning source of funds, revenues, per capita income, and per pupil expenditures. Arizona is compared to its neighboring states in the Western region of the United States (California, Colorado, Nevada, New Mexico, Texas and Utah) and the national average. In addition and based on the request of the Townhall committee, data on the state ranked first (#1) in the nation are included as appropriate. The logic of comparisons states is based solely on the concept of neighboring states.

Sources of Revenue

Table 4 indicates the three major sources for financing the public schools: federal grants, state appropriations, and local property taxes. Over the past fifteen years there has been a major shift in the source of funds to support public education, from the local to state levels. In 1970, for example, 48 percent of the funds to support public education in Arizona came from local sources, compared to 45 percent from state appropriations. In 1985, 32 percent came from local tax revenues while almost 59 percent came from state appropriations.[14] This shift is consistent with trends in the region and nationally.

Table 4
Distribution of Revenue Receipts of Public Elementary/Secondary Schools for Selected States: Federal, State & Local Sources (in percent)

State	Federal		State		Local	
	1970	1985	1970	1985	1970	1985
Arizona	7.6	8.9	44.6	58.7	47.8	32.4
California	5.1	7.9	35.2	67.5	59.8	24.5
Colorado	7.3	4.7	30.3	39.6	62.4	55.8
Nevada	16.6	5.4	63.4	40.3	20.0	54.3
New Mexico	6.9	12.7	36.8	75.0	56.3	12.3
Texas	10.0	6.6	49.3	47.1	40.7	46.3
Utah	5.5	5.9	54.7	51.8	39.8	42.3
U. S. Average	6.9	6.5	41.1	48.8	52.0	44.7

Source: U.S.Department of Education. Digest of Educational Statistics, 1987.

Expenditures and Revenues for Education

Three different groups currently report data concerning expenditures for education: the U.S. Department of Education, the U.S. Bureau of the Census, and the National Education Association. Depending on the source of the data used, different interpretations of where Arizona ranks on per pupil expenditures (PPE) are possible. Differences in rankings can be attributed to errors in the reporting of state data, decisions of what to include in calculating educational expenditures, and ways of measuring pupil attendance.[15]

Table 5 indicates the expenditure per pupil according to the U. S. Department of Education. The data show that while per pupil expenditures for education have increased in Arizona, it has not kept pace with other states in the region or with the national average.

Table 5

Current Expenditure Per Pupil in Average Daily Attendance in Public Elementary and Secondary Schools, by Southwestern State: School Years ending 1970 and 1986

State	Expenditure Per Pupil (1985-86 dollars) 1970	1986	Percent Increase
Arizona	2,075	3,093	49.1%
California	2,498	3,543	41.8%
Colorado	2,126	3,975	87.0%
Nevada	2,217	3,440	55.2%
New Mexico	2,037	3,195	56.9%
Texas	1,798	3,298	83.4%
Utah	1,804	2,390	32.5%
#1 Alaska	3,234	8,253	55.2%
United States Average	2,351	3,752	59.6%

Source: US Department of Education. The Condition of Education, 1988.

One possible interpretation of the data is that Arizona is having difficulty keeping pace with the many pressures of rapid population expansion and that this is reflected in slower growth rates in per pupil expenditures than slower growth states. Also, school expenditure data often exclude bonded indebtedness (used to pay for new school buildings and expansion of existing facilities). Once voters are asked in bond elections for monies for school buildings and expansion they may be less willing to vote for additional taxes to pay for higher teacher salaries or more expensive instructional programs. This is one of the hidden costs of being a state with significant population growth.

Revenues in Relation to Per Capita Income

Revenues in relation to per capita income speaks to the issue of how much money is available to elementary and secondary public schools. Table 6 examines per pupil education **revenues**, a different figure than per pupil expenditures, and relates it to population, personal income and per capita personal income. Arizona is last among the compared southwestern states and ranks 49th in the nation in this category, with Alabama the only state with a lower state index. While the wealth of the state as measured

by per capita personal income ranks in the middle of the 50 states, public school revenues are nearer the bottom. Taken together, this ratio ranks Arizona 49th in the nation.

Table 6

State Indices of Public School revenues Per Pupil Relation to Per Capita Income: School Years Ending 1980 and 1987

	State Index 1980	1987	State & local education revenues (thousands) 1987	Public elementary/ secondary enrollment Fall 1986	Per pupil education revenues 1987	Total personal income (millions) 1986	Total population (thousands) 1986	Per Capita personal income 1986
Arizona	25.1	19.3	1,387,060	534,538	2,595	44,719	3,319	13,474
California	21.6	22.2	16,463,619	4,377,989	3,761	456,098	26,981	17,472
Colorado	26.9	28.6	2,433,400	558,415	4,352	49,771	3,267	15,441
Nevada	18.2	21.7	540,519	161,239	3,352	14,870	963	11,423
New Mexico	25.2	27.3	880,451	281,943	3,123	16,894	1,479	11,423
Texas	20.4	26.9	11,648,726	3,209,515	3,629	224,877	16,685	13,478
Utah	24.2	23.8	1,088,471	415,994	2,617	18,288	1,665	10,984
#1 Wyoming	25.7	54.5	703,950	100,955	6,973	6,485	507	12,791

Source: U.S . Department of Education. The Condition of Education, 1988.

Attendance, Enrollment, and Pupil-Teacher Ratio

Two additional educational indicators are compulsory attendance requirements and pupil-teacher ratio. Table 7 looks at ages for compulsory attendance laws. Arizona, provides for the fewest years of compulsory schooling of any state in the region and, although not shown, the fewest years of compulsory schooling of any state in the nation. A decision to require an additional year or two of compulsory attendance (from age 16 to age 17 or 18) would have obvious and immediate fiscal implications.

Table 7

Ages for Compulsory School Attendance, by State: 1985

State	Compulsory Attendance
Arizona	8 to 16
California	6 to 16
Colorado	7 to 16
Nevada	7 to 17
New Mexico	6 to 16
Texas*	7 to 16
Utah	6 to 18

* Must complete academic year in which 16th birthday occurs.

Source: U.S. Department of Education. Digest of Education Statistics, 1987.

Table 8 addresses the issue of pupil-teacher ratio. Although it is not possible to directly connect pupil-teacher ratio with educational performance, it is an additional indicator of a state's expenditure on education. Comparing 1982 and 1987, Arizona has improved, on the average, with smaller class size and a reduced pupil-teacher ratio (from 19.8 to 18.4). Compared with other states, Arizona ranks 36th nationally, up from 37th in 1982.

Table 8

Pupil-Teacher Ratio, 1982 and 1987

State	1982	(Rank)	1987	(Rank)
Arizona	19.8	(37)	18.4	(36)
California	23.1	(50)	23.0	(50)
Colorado	18.7	(30)	18.2	(33)
Nevada	21.1	(46)	20.4	(46)
New Mexico	18.8	(31)	19.0	(41)
Texas	18.4	(25)	17.3	(26)
Utah	27.4	(51)	23.4	(51)
#1 Connecticut	15.0	(1)	14.0	(1)
US Average	18.9		17.8	

Source: U.S. Department of Education. State Education Statistics,1988.

To Sum, when Arizona is compared with other states and the nation on indicators such as revenues per pupil, expenditures per pupil, and years of compulsory attendance, Arizona ranks below the national average. With regard to the ratio of a states per capita income compared to public school revenues per pupil, an indicator interpreted to reveal the committment of a state to its schools, Arizona ranks 49th; concerning required years of schooling, Arizona ranks last in the nation. One noted exception for Arizona schools has been the pupil-teacher ratio, where Arizona compares somewhat more favorably (36th).

TYPICAL PRACTICE: DESCRIPTION OF STUDENT PERFORMANCE

This section looks at student performance on a number of educational outcomes. Descriptive and comparison data are presented for five measures: (1) college entrance examinations; (2) Merit Scholarship Awards; (3) Advanced Placement tests; (4) standardized achievement tests; and (5) high school graduation. As with the previous section, comparisons are made with neighboring states with the state ranked first and the national average given where approapriate.

College Entrance Examination Scores

One indicator of student achievement is scores on college entrance examinations, namely, the Scholastic Aptitude Test (SAT) and the American College Testing Program (ACT). The national trend in college entrance examinations show a decline in scores beginning with the 1963-1964 school year that continued through the 1979-80 school year. Though much of the decline in early years has been attributed to increases in the percentages of lower ability students taking the examinations, decline in scores in the later years is more attributed to a collection of factors, including school relevance and rigor.[16]

Table 9 looks at the number of Arizona students taking one of the college admissions exams (ACT or SAT). Table 10 looks at ACT scores only, because the majority of students in Arizona (and the five states listed) take the ACT rather than the SAT.

Table 9

American College Testing Program (ACT) and Scholastic Aptitude Test (SAT) for Arizona High School Students

Year	Number of Students Taking ACT	Number of Students Taking SAT	Total
1984-85	11,547	4,402	15,949
1985-86	10,934	5,045	15,979
1986-87	11,214	6,463	17,677
1987-88	11,549	7,039	18,588

Source: Arizona Department of Education. Statewide Report for Arizona Pupil Achievement Testing,1988.

Table 9 indicates that the actual number of Arizona students taking either or both examinations for college admission has gone up since 1984-85. However, Table 10 indicates that the **percentage** of high school graduates taking the ACT **has actually declined since 1982**. This decline is not accounted for by students opting for the SAT examination.

Table 10

American College Test Scores: 1982 and 1986

	Average ACT Score of High School Grads 1986	Percentage of High School Grads Taking Test in 1986	Average ACT Score of High School Grads 1982	Percentage of High School Grads Taking Test in 1982
Arizona	19.3	38.2	18.7	41.2
Colorado	19.9	63.4	19.6	66.8
Nevada	19.1	40.5	18.3	44.5
New Mexico	18.0	53.9	17.6	56.5
Utah	18.9	67.2	18.4	66.4
#1 North Dakota	18.8	68.3	17.8	64.5
U.S. Average	18.7		18.4	

Source: US Department of Education. State Education Statistics,1988.

Table 10 also shows that the average ACT score of high school graduates in Arizona has gone up since 1982 from 18.7 to 19.3. However, it is unclear whether the increase is attributable to the decline in

the percentage of students taking the exam. And, the percentage of high school graduates taking the Test in 1986 (38.2%) ranks Arizona 26th out of the 28 ACT states .

Achievement of Gifted and Talented Students

Another indicator of educational outcome is how the brightest or most able students are achieving. Two sources of data are relevant to this discussion: (1) student performance in the Merit Scholarship Program, and (2) student participation in advanced placement courses.

Merit Scholars

According to Eckland the National Merit Scholarship Corporation was founded in the middle 1950s to identify high school students "who would merit special commendation and economic incentive".[17] In 1971, the National Merit test was combined with the Preliminary Scholastic Aptitude Test (PSAT) and eleventh graders wishing to qualify must take what is called the PSAT/NMSQT. For college admissions, students would still be expected to take either the SAT or ACT (or both) as twelfth graders. Table 11 looks at the qualifying selection scores and the number of commended and semifinalist students recognized by the Merit Scholarship Program.

Table 11

1988 Merit Program
Semifinalists and Commended Students - 1986 PSAT/NMSQT

		SEMIFINALISTS		COMMENDED STUDENTS	
	Qualifying Selection Index	Number	Number of Schools	Number	Number of Schools
Arizona	195	163	54	308	81
California	198	1,421	440	3,442	718
Colorado	196	196	68	498	131
Nevada	188	47	21	64	25
New Mexico	195	99	27	169	41
Texas	196	912	227	1,963	453
Utah	195	116	34	200	50

Source: National Merit Scholarship Corporation. Annual Report, 1987.

Table 11 gives information concerning the qualifying scores for students in Arizona and other states in the region, the numbers of students identified as a "semifinalist" and those identified as

"commended." Commended students are those achieving excellence, although no qualifying score is given and no financial incentives are provided. The National Merit Scholarship Program does not reveal the percentage of semi-finalists who are actually awarded scholarships. In part this decision is based on examination score, the college attended, and a student's background variables. A comparison of qualifying scores shows Arizona to be tied for fourth in the region, where only Nevada's students qualify with lower scores. Similarly, the number of students identified appears lower than expected if one compares it to Colorado, which has almost the same school age population (see Table 6).

Advanced Placement Participation

High school students across the nation are given the opportunity to earn college credit through Advanced Placement courses. Table 12 presents data on advanced placement candidates as a percent of high school graduates.

Table 12

Advanced Placement Candidates

(as a percent of graduates)

	1987	(Rank)	1982	(Rank)
Arizona	7.7	(28)	3.5	(25)
California	16.7	(6)	8.1	(5)
Colorado	13.1	(10)	8.1	(5)
Nevada	10.2	(16)	1.7	(32)
New Mexico	8.8	(22)	1.7	(32)
Texas	5.2	(35)	1.9	(30)
#1 Utah	26.6	(1)	11.8	(1)
US Average	9.7		4.7	

Source: US Department of Education. State Education Statistics ,1988.

The data indicate that while Arizona has more than doubled its percentage of qualifying students, this figure has not kept pace with regional or national trends. And in fact, Arizona has fallen from 25th nationally to 28th nationally over the five year period 1982-87.[18]

Pupil Achievement Testing

Another way of looking at educational outcomes is to look at the results of the tests administered in the 1988 Arizona Pupil Achievement Testing Program, namely the ITBS (grades 1-8), the SAT-7 (grade 9), and the TASK (grades 10-12). These are nationally standardized achievement tests that have been administered under specific conditions to a representative sample of students across the nation. Scores that result from the norming sample allow comparisons of the performance of particular pupils or groups of pupils to that of the typical pupil of the same age and grade.

Arizona is the only state in the nation which requires that all students from 1st through 12th grades take a standardized achievement test every year. Legislation passed in 1988 (SB 2111) permits local districts, for the first time, to decide whether first or twelfth graders are to be tested. Approximately one week out of the school year and close to $1 million per year represent some of the resources devoted to this testing program.

Results of the 1988 Arizona Pupil Achievement Testing Program

The Arizona Department of of Education reports that Arizona students achieving in the average range: "Arizona pupils collectively scored in the average range in all areas tested on all tests taken (ITBS, SAT-7, and TASK) in all twelve grades.[19] This is evidence of the fact that Arizona pupils performed at about the same level of achievement as average pupils in grades 1 through 12 across the nation."[20] The tests are composed of numerous subtests combined to form subject or content domains such as reading, language, and mathematics. Although the tests claim to measure a broader base than just these subjects, the Arizona legislature has mandated testing of reading, language, and mathematics.

Another way to interpret the overall performance of Arizona pupils is to look at average stanines. Of the 124 skills and areas measured across grades 1 through 8, Arizona pupils, on a scale of 1 to 9 (with an average score being 5), obtained an average stanine of 5 on 98 skills (79%) and an average stanine of 6 in the remaining 26 skills (21%).[21]

High School Graduation

Another indicator of performance is graduation rate from high school. According to Hodgkinson, high school graduation is directly related to state-level economic development.[22] A state with a high percentage of its youth graduating yields a "net gain" with a high probability of that person getting a job and repaying the state many times over for the cost of his/her education, through taxable income. On the other hand, a state with a poor record of retention to high school graduation, suffers a "net loss" for the state, because without a high school diploma, the chances of a student's finding work and thereby repaying the state's investment is diminished.

Table 13 provides data for Arizona's high school graduation rate and provides comparison data from other states in the region.

Table 13
High School Graduation Rate (Adjusted)

State	1982	Rank	1985	Rank	1986	Rank
Arizona	63.4	(44)	64.2	(42)	63.0	(47)
California	60.1	(49)	67.0	(39)	66.7	(41)
Colorado	70.9	(29)	74.0	(28)	73.1	(28)
Nevada	64.8	(40)	70.9	(34)	65.2	(42)
New Mexico	69.4	(33)	73.4	(30)	72.3	(29)
Texas	63.6	(43)	66.0	(41)	64.3	(44)
Utah	75.0	(17)	81.4	(10)	80.3	(12)
#1 Minnesota	88.2	(1)	91.5	(1)	91.4	(1)
U.S. Average	69.5		71.7		71.5	

Source: US Department of Education. State Education Statistics, 1988.

Arizona's graduation rate falls below the national average and ranks near the bottom of the nation (47th out of 51 in 1986); its relative standing among the states has declined during the past five years.

Non-Promotion

A related but separate issue deals with promotion from grade to grade. Shepard and Smith report that retention in grade has no benefits for either school achievement or personal adjustment.[23] Yet, as

Doyle reports,during the 1986-87 school year 15,183 Arizona elementary school children failed to be promoted to the next grade.[24] At $3,093 (1986 per pupil expenditure figure)per child the costs associated with providing an extra year of schooling is approximately $45 million. In spite of the the research evidence that shows non-promotion as having harmful effects to students (i.e., students making slower academic progress than comparable under-achieving students; subsequent dropping out of school) the percentage of non-promoted elementary students in Arizona is increasing.

Table 14

Percent of Non-Promotion in Arizona Elementary Schools since 1950
(averaged for five year periods)

1950-1954	4.3%
1955-1959	4.1%
1960-1964	3.4%
1965-1969	3.3%
1970-1974	2.4%
1975-1979	3.2%
1980-1984	3.5%
1985-1987	3.8%

Source: Doyle, 1988.

Looking at the data over eight five-year blocks of time, Table 14 shows the percent of non-promoted elementary pupils as increasing since 1970-74. For those who believe that the cure (non-promotion) may be worse than the disease (underachievement in school), the rise in the percentage of non-promoted students since 1974 is suggestive of an education system failure in Arizona.

Summary

To sum, the educational performance of Arizona pupils on a number of indicators is described. Higher ACT scores are mitigated by the fact that a smaller percentage of students took the exmaination in 1986 than in 1982 . Results of the National Merit Scholarship Exam indicate lower cutoff scores and fewer semifinalists and commended students when Arizona is compared with Colorado, a state with a similar number of students. Graduation rate ranks Arizona 47th in the nation and relative standing has declined over the past few years. Advanced placement participation, while on the rise, places Arizona

below the national average and Arizona ranks lower among the states in 1987 than 1982. Pupil test scores reveal, at best, "average " performance. Finally, a rise in pupil non-promotion is documented.

MAKING SENSE OF STATE COMPARISONS: THE ANALYSTS' VIEW

At first glance, the data contained in the description of typical practice do not present a particularly optimistic picture of Arizona's educational system. The conclusion of an analysis of the data presented in Tables 1-14 by Danzig and Mungazi suggested that lack of financial resources necessary to keep up with population growth was at the root of academic decline in Arizona and that recognition of this fact was a required first step in doing something about it:

> "Although dollars will not guarantee educational success, they may be a required first step to ensure the success and assure the long term future of the schools within a state. Arizona, a state with a growing population and higher than average growth in the school-age population, and with increasing numbers of ethnic and language minority students, faces particular difficulties. Per-pupil revenues and expenditures, pupil-teacher ratio, and compulsory years of schooling all place Arizona no higher than the bottom third and sometimes last in the nation. The consequences seem to be average pupil achievement, loss of some of the most gifted and talented students to out-of-state universities, low and decreasing high school graduation rates, and increasing percentages of non-promotion in the elementary grades. Recognition of and agreement on these realities may be the first step in reversing the downward trends."[25]

However, this is only one possible interpretation of the data and does not rule out alternative explanations. More importantly, it does not address the way researchers select information and data which confirms their own expectations and those of policymakers. Since the reader receives no assistance in how to read or reflect upon the data, the elegance, clarity and perhaps volume of the statistics contribute to the readers sense of accuracy and the veracity of its interpretation.

What is Useful about State Comparisons and Education Indicators?

While rankings and other education indicators are intended to inform policymaking, it is not clear how policymakers use them to define courses of action. One way to judge usefulness may be to look at how state comparisons stimulate debate over problems, issues and solutions. In this view, state-by-

state rankings reduce complexity and focus debate; simplicity and efficiency are their virtue as they make issues appear more manageable. State comparisons also function as symbolic and political gestures in order to make the schools appear to be accountable, without which, public willingness to spend more money on education may be reduced. State comparisons inform us of thresholds, of how far the system needs to come before it reaches the top and of why the goal has not been attained. Finally, where rankings provide multiple evidence points and allow for triangulation, the likelihood of accurate interpretation may be increased. Each of these views are explored in greater detail below.

Education Rankings As Communication and Discourse

The effort to collect educational statistics as a basis of informing education policy is not new. Travers points to the work of Horace Mann in Massachusetts and Henry Barnard in Connecticut as laying the foundation for federal efforts to systematically collected education-related data.[26] Travers suggests the motive and guiding principle behind the establishment of a central collection point for data was the view that "policies should be guided by empirical information."[27] Murnane, also looks at federal efforts to collect educational data from which state-by-state comparisons could be made.[28] While enrollment statistics were collected in the 19th century, it was during the 1950s and 1960s, that the federal role was extended to include information about what students learned in schools. In this view, educational rankings provided an authoritative and socially relevant knowledge which in turn affected decision making.

Cohen and Garet suggest viewing research as a form of discourse.[29] The notion of research as discourse calls attention to the norms of communication which affect decision making, and to new problems and issues such discussion generates. Research, data collection and reporting are not simply technical activities or a better way of deciding what to do. Rather, the importance of such work is in influencing broad assumptions and opening up new questions as well as answering old ones. The goal of such discourse is to open up communication and ways of focusing on key issues.

State-by-state rankings provide a forum from which it is possible to debate the meaning and importance of not only the findings but of the questions asked (and those not asked). Federal reporting of state education statistics such as state-by-state rankings are not simply amassing of truths indiscriminantly; they are selective and simplicity of presentation is its virtue. The greater the complexity

of facts, the less chance of surviving. Volume of information is also related to usefulness. The Annual Report of the Superintendent of Public Instruction provides an example.[30] In Arizona, such reporting goes back to the 1880s, is required by statute and provides education statistics on school enrollment, expenditures and budget. Since data is collected on a regular basis (for the most part annually), in addition to answering questions about who and how many, the Report provides the reader the opportunity to make comparisons not only between groups, but to look at changes over time and possible implications. Though seemingly straightforward, the volume of information (241 pages), format of presentation (mostly school district, county and state summaries of budget printouts) affects who will read a report and how it is distributed. In 1987, only 625 copies of the document were printed.[31] In contrast, one finds a more limited scope (24 pages) and fewer tables (9) in the report by the Arizona Department of Education comparing Arizona and the top ten states on per pupil expenditure;[32] yet 3000 copies were printed and disributed, at no cost.

If the usefulness of state-by-state comparisons is seen in their influence over state level policy debate, and complexity and volume of information affect discourse, distribution of ideas and potential impact, smaller and simpler are better. The debate over per pupil expenditures (presented in Tables 5 and 6) has in fact generated two statistical reports by the Arizona Department of Education which compare Arizona to other states and explain why Arizona ranks so low in the federal reports.[33] And the Governor recently formed a statewide task force "Fiscal 2000" to address funding issues for education which include per pupil expenditures. Again, it is the the reduced scope of reporting on per pupil expenditures (rather than school finance in general) which makes it more useful in furthering public discourse on the topic.

Rankings and Financial Support for the Public Schools

Kirst points out that public perceptions and willingness to finance public education are often dependent on issues outside the public schools.[34] In the 1950s Sputnik, in the 1960s and 1970s, the War on Poverty, and in the 1980s, concern with American competitiveness abroad, have fueled educational reform. Between 1970 and 1980, state governments increased their total spending on

education from $16.6 billion to $46.5 billion, an increase of 44.5 percent in real dollars. State share of funding rose from 37 percent to almost 50 percent, while local and federal shares declined. Also, per pupil expenditures rose by about 9 percent in real terms during 1983, and increased faster than inflation during 1984 and 1985.[35] Kirst suggests that states will not be able to simply spend more money on education; if educational reform is to be successful, then effort is needed to determine which reforms of the past ten or fifteen years have been most successful and which reforms seem to be more cost-efficient. In Kirst's view, educational rankings that reflect pupil performance (Table 10 on ACT scores, Table 12 on Advanced Placement candidates and Table 13 on high school graduation rate) provide some of the data needed by state policymakers to argue for increased funding for education.

Avoiding Thresholds

Education indicators may also function as warning signals. Vickers points out that when we drive a car, we are controlled not so much by an imaginary course but by the warning signals as we move to the threshold of our driving track.[36] We set out therefore, not so much to to hold a course but to avoid the thresholds. The difference between pursuing a track and avoiding a threshold are many. For one, "if we pursue a norm we may eventually attain it and thus discover whether we really like it; whilst, so long as we avoid a threshold, we can never tell, except as the result of failure, whether it deserved the respect we accorded it."[37] State education rankings function as the threshold. Being ranked first, regardless of what it means to be first or how a state achieves this goal is the standard to be attained; being at or near the bottom is something to be avoided.

The decision to compare a state to the number one ranked state (in this paper) or the top ten ranked states (Sloat, reflects two different interests of the policymaker.[38] The policymaker 's interest may be in how the system is doing, and particularly, how far it has to go to reach the top of the pile. Or, it may be the case that policy maker wants or needs to explain the relatively low standing of a state on a particular indicator. For example, the comparison between Arizona and the ten states ranked highest on per pupil expenditure done by the Arizona Department of Education explains:

> By comparing and contrasting these states with Arizona and the national average, it is hoped that policymakers, education professionals and the general public will better understand the socieconomic and fiscal characteristics which determine Arizona's educational environment and placement in national rankings.[39]

Arizona's relatively poor perfomance is contextualized by socioeconomic and fiscal characteristics by the researcher . For the policymaker, however, the opportunity to explain away poor performance may be more important.

Which States to Compare? The decision concerning which states to compare has implications yet is typically given little discussion . The federal government, for example uses all fifty states , the district of Columbia and a national average in its state comparisons charts. As previously mentioned, this analysis uses a "neighboring states" perspective, in comparing Arizona to other states in the Southwest and the nation. Policy Analysis fopr California Education (PACE, compares Californial with six other states on many of its charts and tables, and tells its readers "comparisons are made among large states with diversified economies and similar costs of living."[40] The comparison states include Texas, New York, Illinois, Pennsylvainia, and Michigan but little discussion of what makes these comparisons viable is included and we take it for granted that they make for good comparisons. Do comparison states have growing populations, declining populations, etc.? Are they similar in taxing capacity? State comparisons which take into account each state's size, geography and economy still overlook unique history and circumstances. Have comparison states established different goals for their students and taught different curricula, thereby making comparisons of selected outcomes unfair?[41]

State comparisons do not reveal inconsistencies in the reporting of educational statistics among the states. For example, in the reporting of educational expenditures reported in Table 5, some states may include categories that are ignored in other states, such as capital outlay. (See Sloat,[1988], for a discussion of this point.) Or states may define high school dropouts differently by deciding to include or exclude individuals studying for the high school equivalency diploma (G.E.D.).

Multiple Evidence Points and Education Trends

When multiple evidence in the same direction exists, the likelihood of accurate interpretation is increased. For example, Table 5 on per pupil expenditures, Table 6 on per capita income/school expenditures, Table 10 on on percentage of students taking college admissions tests, Table 13 on advanced placement candidates and Table 15 on non-promotion, indicate decline or slower than regional or national growth. Taken as a group, the indicators might be interpreted with greater confidence to indicate comparative decline and the search for explanation becomes more warranted.

Demographic indicators may also predict coming changes in education programs and practices. Table 2, for example, announces coming changes in the percentage of minority students in the Arizona public schools. This in turn may have affected the decision to ask questions about and do research on primary home language of Arizona pupils (found in Table 2), and the future development of bilingual and English as a Second Language programs to serve the limited English proficient population.

Trends in the Source of Funds and Control of Education. A trend that may have been anticipated by looking at education indicators has to do with educational revenues. Table 4 shows a shift over the fifteen years 1970 to 1985 in the source of revenues (federal, state and local) for public elementary and secondary schools. As the percentage of revenue receipts at the state level grew, it may have been possible to anticipate increased demands for accountability at the state level and the growth of educational reform measures at the state level. Whether an education indicator such as the one reported above has predictive possibilities or the explanation is merely an after the fact reconstruction , the goal of some degree of predictive usefulness seems warrented.

Graduation Rate Trend and What to Do About It. Noticing a trend does not yield automatic insights into what to do about the findings. For example, Table 13 on the High School Graduation rate shows that Arizona ranks 47th in the nation with a 63% graduation rate in 1986 (down from 64.2% in 1985). The immediate implication is that public schools need to work harder to improve graduation rate. However, Green makes the case that in certain circumstances, a lower rather than higher graduation rate will allow for a more equitable social distribution.[42] In this view, a lower percentage of graduates may reduce the ability

of the employment sector to penalize non-attainers. In this context, reporting the the percentage of high school graduates does not necessarily determine what policy recommendations best address the issue.

Further, it is difficult to anticipate is how policymakers will use education rankings to change or reform the system? Will policymakers approach reform incrementally, addressing attention to only one aspect of the system at a time or work to improve the entire education system using multiple approaches.[43] Arizona seems to have approached educational reform in an incremental fashion, in which policymakers have addressed their attention to one aspect of the education system at a time. Efforts at reform included teacher testing and teacher residency programs initiated in 1980 with more recent initiatives on early childhood, statewide curriculum development and criterion-referenced pupil tests. Regardless of the content and scope of reform efforts, greater state level involvement might have been predicted as increasing percentage of the funds to support public education shifted from the local to the state level. This in turn has affected the types of questions asked and reform measures proposed.

FACTORS WHICH LIMIT INTERPRETATION OF PUPIL TEST SCORES

The final section looks at factors specific to the comparison and interpretation of pupil test scores. With the expansion of state-to-state comparisons of pupil achievement additional caveats seem in order.

Caution in the Interpretation of Test Scores

Murnane argues that the collection of data on student achievement creates a new set of questions concerning student achievement.[44] Do the tests measure higher- or lower-level thinking skills? Do multiple choice formats lend themselves to factual recall only? Are the patterns of increase and decline of test score averages interpretable? He poses four additional questions:

Who Takes the Exams? Before making comparisons among states, testing programs might address other aspects of the testing situation. Who takes the examinations? Response rates of state and local schools districts and individual schools and classrooms are often a function of how potentially low scoring children are excused or excluded from the tested sample. Are special-needs children or children whose first language is not English considered part of the relevant population?

What Types of Questions are Asked? What types of examination questions are used? It would be particularly valuable to look at how students solve problems rather than just correct and incorrect responses on multiple choice formats. Murnane proposes not restricting student answers to a pre-determined set of possibilities in order to examine this aspect of student ability.[45]

What Types of Generalizations will be Made? Horst, Tallmadge and Wood point to twelve errors of interpretation commonly made when looking at student achievement data to make judgments concerning school effectiveness.[46] The issue that stands out is the assumption that pupil achievement scores gains or losses can be attributed to what is actually going on in individual classes and schools. They suggest that changes in school programs, personnel, facilities, class sizes, and community can all affect student performance data. Farr and Fay, in looking at reading trend data in the United States, suggest that comparisons of states on test scores is a risky venture because the available data are too mixed up to sort and make interpretations concerning the quality of schools and programs.[47]

Who Determines What is Valid Knowledge? Criticism of examination content limits valid interpretation of pupil test scores. The National Academy of Education points out that we tend to measure what we can; and over time, we eventually come to value what we measure.[48] Since we know how to measure reading, writing and mathematics, they become what society values. Teachers may then feel pressure to reduce emphasis on topics that are not covered on the tests in order to show good scores on the subset of school goals that are included in an assessment. Personal qualities such as a sense of craft, a commitment to justice and caring, dedication to the public good, which are difficult to assess, may become ignored. And, textbooks may increasingly resemble the test-items that are used on these examinations.

The International Reading Association resolution on the assessment of reading also raises the question of "ownership" over the knowledge in a field and how it will be assessed.[49] IRA expresses concern that traditional assessment techniques and assumptions often "drive" instruction in ways that are sometimes contradictory to the best available knowledge and practice and that testing programs based on inadequate and inaccurate definitions of subject matter prevent accurate interpretation and comparisons.

Ellwein, Glass, and Smith (1988) suggest caution when noting that pupil performance data function as "symbolic and political gestures, not as instrumental reforms."[50] They argue for more extensive evaluations of the impacts of testing programs on the classrooms and schools affected. Comparisons need to be useful for examining the effects of instructional variables on school outcomes. The depth and detail of data that are needed to analyze the impact of educational processes on student performances are lacking in the national rankings; they require smaller scale research that addresses specific instructional concerns rather than broadly defined educational indicators that are more likely a reflection of a state's wealth than educational success.

SUMMARY AND CONCLUSION

The essay began by presenting a description of the education system in Arizona; its form was excerpted from national data sets and selected education comparisons and indicators were presented in a straightforward fashion similar to many reports received by legislators, members of state boards and state departments of education and other education policymakers. Data were presented on demographics, per pupil expenditures, attendance, enrollment, and pupil-teacher ratio. This was followed by discussion of educational outcomes including pupil performance, ACT scores, participation in advanced placement courses, graduation and high school graduation rates. The source of much of the data was the U.S. Department of Education, and in particular, the state-by-state rankings found in the "Secretary's Wall Chart."

After presenting this quantitative portrait of Arizona schools, the attempt was made to show how one might make sense of the numbers which portray Arizona's education system. It was argued that interpretation of state-by-state rankings allows for modest opportunities for understanding the strengths and/or weaknesses of the system. Education rankings are seen as useful as they call attention to certain ways of looking at problems; they assume greater importance as they shape dialogue, discourse and research questions. The need to insure financial support for public schools is seen as a function of state-by-state rankings. Convergence of multiple indicators is seen as warranting further explanation for and identification of education trends though such efforts seem risky at best. The essay concludes by highlighting some of the difficulties in the interpretation of state rankings of pupil achievement.

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